High performance electrocoagulation process in treating palm oil mill effluent using high current intensity application

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ABSTRACT

Electrocoagulation process using high current intensity to treat palm oil mill effluent (POME) was investigated in this study. Various operating parameters such as electrolysis time, inter-electrode distance and initial pH were carried out to determine the efficient process condition on the removal of chemical oxygen demand (COD), biological oxygen demand (BOD) and suspended solids (SS). The highest treatment was achieved at 50 min with the removal efficiencies for COD, BOD and SS obtained as 85%, 83%, and 84%, respectively. More than 50 min treatment showed the fluctuated trends of removal efficiencies which can be considered insignificant. The application of higher current resulted in higher removals of organics while the gas bubbles also assisted in removing the pollutant particles by floatation. In an inter-electrode distance study, the removal efficiency decreased when inter-electrode distance was either higher or lower than 10 mm due to the increase of solution resistance and the decrease of anode active surface area. In initial pH study, it was found that high removal efficiencies were achieved in slightly acidic POME sample rather than in neutral or basic condition. An electrocoagulation process by using the optimum operating parameters was able to remove COD, BOD and SS up to 95%, 94% and 96% respectively. The experimental results confirm that application of high current intensity in electrocoagulation provided high treatment efficiency at a reduced reaction time.

KEYWORDS: Electrochemistry; Environment; Electrocoagulation; Palm oil mill effluent; High current intensity

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